

Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1.(currently amended) An apparatus for use with a radiolucent skull clamp supporting a head of a patient comprising:

a skull pin assembly adapted to be mounted ~~with respect~~ to the skull clamp, the skull pin assembly comprising a skull pin adapted to be movable into contact with the head of the patient; and

a pin load applicator adapted to be removably connectable to the skull clamp pin assembly and comprising

a loading shaft in mechanical communication with the skull pin,

a biasing element operable to apply a force on the loading shaft, the loading shaft in turn transferring the force to the skull pin contacting the head of the patient, and

a load force indicator connected to the loading shaft and providing an indication of the force being applied by the skull pin contacting the head of the patient, the loading shaft, the biasing element and the load force indicator being contained in a unitary component that is connectable to and disconnectable from the skull clamp as a single component,
the pin load applicator being movable to adjust the force applied by the skull pin contacting the head of the patient, and thereafter, the pin load applicator being removable from the skull clamp pin assembly without changing the force being applied by the skull pin contacting the head of the patient.

2.(original) The apparatus of claim 1 wherein the skull pin assembly can be fixed at a desired position with respect to the skull clamp.

3.(original) The apparatus of claim 1 wherein the skull pin assembly is linearly movable with respect to the skull clamp.

4.(original) The apparatus of claim 1 wherein the skull pin assembly further comprises an engagement shaft adapted to be movable in a linear direction with respect to the skull clamp and the motion of the engagement shaft in the linear direction is limitable.

5.(original) The apparatus of claim 1 wherein the pin load applicator is movable with respect to the skull clamp to bring the loading shaft in contact with the engagement shaft and to apply the force to the skull pin contacting the head of the patient.

6.(original) The apparatus of claim 1 wherein the biasing element applies a force against the loading shaft in a direction toward an interior of the skull clamp.

7.(original) The apparatus of claim 1 wherein the biasing element is a compression spring.

8.(original) The apparatus of claim 1 further comprising an insert adapted to be mounted to the skull clamp, the insert receiving and supporting the skull pin assembly.

9.(original) The apparatus of claim 8 wherein the skull clamp has a bore at one end and the insert is adapted to be rigidly mounted in the bore.

10.(original) The apparatus of claim 8 wherein the skull pin assembly further comprises an engagement shaft adapted to be slidable but not rotatable with respect to the skull clamp.

11.(original) The apparatus of claim 10 wherein skull pin assembly further comprises a lock nut threaded on an inner end of the engagement shaft to limit slidable motion of the engagement in a direction extending outward from the skull clamp.

12.(original) The apparatus of claim 11 wherein the skull pin assembly further comprises a piston supported by the engagement shaft and connected to the skull pin.

13.(original) The apparatus of claim 12 wherein the piston is threaded within the engagement shaft and movable to change a length of the skull pin assembly.

14.(original) The apparatus of claim 12 wherein the skull pin is supported by an inner end of the piston.

15.(original) The apparatus of claim 10 wherein the pin load applicator is threadedly mountable on the insert to bring the loading shaft in contact with the engagement shaft.

16.(original) The apparatus of claim 10 wherein the loading shaft has a plunger on the inner end, the plunger contacting one end of the biasing element and receiving the force therefrom and transmitting the force to the engagement shaft.

17.(original) The apparatus of claim 1 wherein the skull pin assembly is made from only radiolucent materials and the removable pin load applicator comprises a nonradiolucent material.

Claims 18-24 (Previously Withdrawn)

25.(new) An apparatus for use with a radiolucent skull clamp supporting a head of a patient comprising:

a skull pin assembly adapted to be mounted to the skull clamp, the skull pin assembly comprising a skull pin adapted to be movable into contact with the head of the patient; and

a pin load applicator adapted to be removably connectable to the skull and comprising

a knob comprising a bore with a threaded portion on one end for removably connecting the pin load applicator to the skull clamp,

a loading shaft located in the bore and in mechanical communication with the skull pin,

a biasing element located in the bore and operable to apply a force on the loading shaft, the loading shaft in turn transferring the force to the skull pin contacting the head of the patient, and

a load force indicator connected to the loading shaft and providing an indication of the force being applied by the skull pin contacting the head of the patient, the knob, the loading shaft, the biasing element and the load force indicator forming a unitary component that is connectable to and disconnectable from the skull clamp as a single component,

the pin load applicator being movable to adjust the force applied by the skull pin contacting the head of the patient, and thereafter, the pin load applicator being removable from the skull clamp without changing the force being applied by the skull pin contacting the head of the patient.

26.(new) The apparatus of claim 17 further comprising:

at least one additional skull pin assembly mounted to the skull clamp and having a corresponding additional skull pin movable into contact with the head of the patient, wherein said skull pin and said additional skull pin contact substantially opposing sides of the patient's head, and the pin load applicator is adapted to adjust the force applied to the patient's head by said skull pin and said additional skull pin.

27.(new) An apparatus for use with a radiolucent skull clamp supporting a head of a patient comprising:

a skull pin assembly adapted to be mounted with respect to the skull clamp, the skull pin assembly comprising a skull pin adapted to be movable into contact with the head of the patient and a holder for holding the skull pin;

a lock mounted on and adjustable relative to the holder, the lock operable to prevent movement of the skull pin away from the head of the patient;

a pin load applicator removably connectable to the skull pin assembly and comprising

a loading shaft in mechanical communication with the skull pin via the holder,

a biasing element operable to apply a force on the loading shaft, the loading shaft in turn transferring the force via the holder to the skull pin contacting the head of the patient, and

a load force indicator connected to the loading shaft and providing an indication of the force being applied by the skull pin contacting the head of the patient,

the pin load applicator being movable to adjust the force applied by the skull pin contacting the head of the patient, so that the lock can then be adjusted relative to the holder so as to maintain said applied force, and thereafter the pin load applicator being removable from the skull pin assembly without changing said applied force being applied by the skull pin contacting the head of the patient.

28.(new) The apparatus of claim 27 wherein said radiolucent skull clamp includes at least two such skull pin assemblies arranged on substantially opposite sides of the patient's head.

29.(new) The apparatus of claim 27 wherein the pin load applicator connects to the skull pin assembly outboard of the skull clamp and the lock is located inboard of the skull clamp.

30.(new) The apparatus of claim 27 wherein the holder has external threads and the lock is a nut sized to threadably engage the external threads of the holder.